

Check-Up

7

Finding a fraction of a quantity

- a) Two-thirds ($\frac{2}{3}$) of the 480 pupils in a school are of non-white ethnicity. Without using a calculator, find how many pupils this is.
- b) One supplier lists a computer as costing £990 but offers schools three-tenths ($\frac{3}{10}$) off the list price. A second store prices the same computer at £1200 but offers two-fifths ($\frac{2}{5}$) off the price. Without using a calculator, decide which is cheaper.
- c) Five-twelfths ($\frac{5}{12}$) of the science departmental budget of £1900 can be spent on textbooks. Use a calculator to find how much this is.

Answers to check-up 7

- a) 320 pupils.
- b) The first (£693) is cheaper than the second (£720).
- c) About £790.

Discussion and explanation of check-up 7

The bottom number in a fraction is called the *denominator*. It tells you into how many equal parts the whole quantity is to be divided. The top number is called the *numerator*. This tells you how many of these parts are required. So, the fraction $\frac{2}{3}$ in example (a) is an instruction to divide the 480 into three equal parts and then to take two of these parts. You should be able to do this mentally, without using a formal written method. First you calculate one-third of 480, which is 160. Then you multiply this by 2 to obtain two-thirds, which is 320 pupils.

In practice, people do sometimes express proportions using simple fractions like $\frac{2}{3}$, $\frac{3}{10}$ and $\frac{2}{5}$. However, it is much more common – and more sensible – to express them using percentages. It is certainly rarely that we will hear people actually use fractions like $\frac{5}{12}$ in real life! So, to be quite honest, examples (b) and (c) here are the kinds of pointless, contrived questions that people get asked in numeracy tests rather than the kinds of statements that you will really encounter in your professional life as a teacher.

So, this is how you might do example (b). To find $\frac{3}{10}$ of £990, first find one-tenth (£99) and then multiply by three ($3 \times £99 = 3 \times £100 - £3 = £300 - £3 = £297$). Subtract this £297 from the list price to get the offer price of £693. Alternatively, you could say that ‘ $\frac{3}{10}$ off’ means that the offer price will be $\frac{7}{10}$ of the list price and simply calculate $\frac{7}{10}$ of £990 directly: $£990 \div 10 \times 7 = £693$. Similarly, for the second supplier, you could find one-fifth of £1200 (£240), double this to get two-fifths and subtract this from the £1200. Alternatively, you could just calculate three-fifths of £1200 directly: $£1200 \div 5 \times 3 = £720$.

In example (c), because the denominator (12) does not divide easily into the given quantity (£1900), it might make most sense to use a calculator to divide by 12 and multiply by 5. The key sequence on the calculator is ‘1900 ÷ 12 × 5 =’. The basic four-function calculator on the computer that I am using at the

moment gives the answer as 791.66666667. This represents just over £790. I am assuming that, in this context, working to the nearest £10 would be a reasonable choice.

Summary of key ideas

- ◆ To find the fraction $\frac{a}{b}$ of a quantity, divide by b (the denominator) and multiply by a (the numerator).
- ◆ If b divides exactly and easily into the given quantity you should be able to handle this mentally (e.g. $\frac{4}{5}$ of £300).
- ◆ Otherwise (e.g. $\frac{7}{12}$ of £3020), use a calculator, rounding the calculator answer appropriately.

Further practice

- 7.1 A teacher walks into the staff room and says, 'Four-sevenths of my class of 28 pupils are girls. How many are boys?' What would you reply?
- 7.2 Precisely 2 in 9 of the 144 trainees on a primary PGCE course are male. How many is this? (Do not use a calculator.)
- 7.3 The Value Added Tax payable on a television is $\frac{7}{40}$ of the catalogue price of £649.99. Use a calculator to find how much VAT is payable.